

WHAT IS CLAIMED IS:

1 1. A router using a distributed implementation of a routing
2 control protocol to route a packet between a plurality of
3 computer networks, comprising:

4 a control-plane having a control-plane processor to
5 implement a central control portion of the control protocol;

6 a plurality of forwarding-planes, each having a
7 forwarding-plane processor to implement an offload control
8 portion of the control protocol and a plurality of ports to
9 connect the router to the computer networks; and

10 a back-plane to connect the control plane to the
11 plurality of forwarding-planes and to enable processing of the
12 packet based on an implementation of the control protocol by
13 the control-plane and the forwarding-plane.

1 2. The router of claim 1, wherein the offload control
2 portion of the control protocol generates an outgoing control
3 message.

1 3. The router of claim 2, wherein the control protocol is
2 OPEN SHORTEST PATH FIRST protocol and the outgoing control
3 message is a HELLO message.

1 4. The router of claim 2, wherein the control protocol is
2 RESOURCE RESERVATION protocol and the outgoing control message
3 is a PATH message.

1 5. The router of claim 2, wherein the control protocol is
2 INTRA-DOMAIN INTERMEDIATE SYSTEM TO INTERMEDIATE SYSTEM
3 ROUTING PROTOCOL and the outgoing control message is a HELLO
4 message.

1 6. The router of claim 1, wherein the offload control
2 portion of the control protocol responds to an incoming
3 request to the control protocol.

1 7. The router of claim 6, wherein the control protocol is
2 OPEN SHORTEST PATH FIRST and the incoming request is a link
3 status request.

1 8. The router of claim 6, wherein the control protocol is
2 RESOURCE RESERVATION and the incoming request is a RESV
3 request.

1 9. The router of claim 6, wherein the control protocol is
2 INTRA-DOMAIN INTERMEDIATE SYSTEM TO INTERMEDIATE SYSTEM
3 ROUTING PROTOCOL and the incoming request is a HELLO request.

1 10. The router of claim 1, wherein the control-plane and the
2 forwarding-plane together implement a plurality of control
3 protocols.

1 11. The router of claim 10, wherein the plurality of control
2 protocols include OPEN SHORTEST PATH FIRST and RESOURCE
3 RESERVATION.

1 12. The router of claim 1, wherein the plurality of ports
2 include a plurality of virtual interfaces on a physical
3 interface.

1 13. The router of claim 1, wherein the forwarding-plane
2 processor includes:

3 a processing engine to implement a plurality of packet
4 processing functions for routing the packet; and

5 a general purpose processor to implement the offload
6 control portion of the control protocol.

1 14. The router of claim 1, wherein the off-load control
2 portion of the control protocol operates to reduce a control
3 flow load on the back-plane between the control-plane and the
4 forwarding plane.

1 15. The router of claim 1, wherein the off-load control
2 portion of the control protocol operates to reduce a
3 processing load on the control-plane processor.

1 16. A method of processing a packet between two or more
2 computer networks using a distributed implementation of a
3 control protocol, comprising:

4 implementing a central control portion of a control
5 protocol in a control-plane of a router and an offload control
6 portion of the control protocol in a forwarding-plane of the
7 router, the control-plane and forwarding plane being connected
8 to each other by a back-plane; and

9 processing the packet based on an implementation of the
10 control protocol by the control-plane and the forwarding-
11 plane.

1 17. The method of claim 16, wherein the offload control
2 portion of the control protocol generates an outgoing control
3 message.

1 18. The method of claim 17, wherein the control protocol is
2 OPEN SHORTEST PATH FIRST protocol and the outgoing control
3 message is a HELLO message.

1 19. The method of claim 17, wherein the control protocol is
2 RESOURCE RESERVATION protocol and the outgoing control message
3 is a PATH message.

1 20. The method of claim 16, wherein the offload control
2 portion of the control protocol responds to an incoming
3 request to the control protocol.

1 21. The method of claim 20, wherein the control protocol is
2 OPEN SHORTEST PATH FIRST and the incoming request is a LSA
3 request.

1 22. The method of claim 20, wherein the control protocol is
2 RESOURCE RESERVATION and the incoming request is a RESV
3 request.

1 23. The method of claim 16, wherein the control-plane and the
2 forwarding-plane implement a plurality of control protocols.

1 24. The method of claim 23, wherein the plurality of control
2 protocols include OPEN SHORTEST PATH FIRST and RESOURCE
3 RESERVATION.

1 25. The method of claim 16, further comprising, separating
2 the control protocol into the central control portion and the

3 off-load control portion to reduce a control flow load on the
4 back-plane between the control-plane and the forwarding plane.

1 26. The method of claim 16, wherein the off-load control
2 portion of the control protocol operates to reduce a
3 processing load on the control-plane processor.

1 27. An article comprising a computer-readable medium that
2 stores instructions for use by a router in processing a
3 packet, the instructions for causing the router to:

4 implement a central control portion of a control protocol
5 in a control-plane of the router and an offload control
6 portion of the control protocol in a forwarding-plane of the
7 router, the control-plane and forwarding plane being connected
8 to each other by a back-plane; and

9 process the packet based on an implementation of the
10 control protocol by the control-plane and the forwarding-
11 plane.

1 28. The article in claim 27, wherein the offload control
2 portion of the control protocol comprises instructions to
3 control a generation of an outgoing control message.

1 29. The article in claim 27, wherein the offload control
2 portion of the control protocol comprises instructions to

3 control a response to an incoming request in the control
4 protocol.

1 30. The article in claim 27, further comprising instructions
2 to:

3 implement a plurality of packet processing functions at a
4 processing engine in the forwarding-plane; and
5 implement the offload control portion of the control protocol
6 at a general-purpose processor in the forwarding-plane.

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